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ETSI EN 303 417 V1.1.1 :2017

TEST REPORT

FOR

Wireless charger

Model No.: P308.821, SW009

Trade Mark: N/A

Report No: ED180514051R

Issue Date: May 21, 2018

Prepared for

Prepared by

EMTEK(DONGGUAN) CO., LTD.

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TEST RESULT CERTIFICATION

Applicant:

Manufacturer:

EUT: Wireless charger

Model Number: P308.821, SW009
(Note: These models are same except model number and appearance, here SW009 was selected for full test.)

Trade Mark: N/A

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
ETSI EN 303 417 V1.1.1	Complied

The above equipment was tested by EMTEK(DONGGUAN) CO., LTD for compliance with the requirements set forth in the European Standard ETSI EN 303 417 . The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.
Reviewed and Approved by:

Date of Test : May 14, 2018 to May 18, 2018

Prepared by : Aaron Tan/Editor

Reviewer : Tomas Yang/Supervisor

Approved & Authorized Signer : Sam Lv/Manager

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	ED180514051R

1. EUT DESCRIPTION

The EUT is a short range transmitter, Details of technical specification, refers to the description in follows:

Product:	Wireless charger
MODEL NUMBER:	P308.821, SW009 (Note: The samples are the same except appearance and model number. So SW009 was selected for full test.)
Power supply:	DC 5V from Adapter
Operating Frequency	175KHz
Modulation	Backscatter
Number of Channels	1

2. DESCRIPTION OF TEST MODES

The EUT has three Operational Mode ,See the table below for details, No software used to control the EUT for staying in continuous transmitting and receiving mode for testing.

Mode 1: base station in stand-by, idle mode
Mode 3: Communication
Mode 4: energy transmission

3. TEST FACILITY

Site Description

EMC Lab. : Accredited by CNAS, 2015.09.24
The certificate is valid until 2018.07.03
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01:2006
The Certificate Registration Number is L3150

Registered on Industry Canada, January 13, 2017
The Certificate Number is 9444A

Name of Firm : EMTEK(DONGGUAN) CO., LTD

Site Location : No.9, New Town Avenue of Songshan Lake High and New Technology Industrial Development Zone Dongguan, Guangdong,China

4. ETSI EN 303 417 REQUIREMENT

Transmitter conformance requirements

ETSI EN 303 417 Subclasses 4.3.2 Permitted range of operating frequencies

The permitted range of operating frequencies is the frequency range over which the equipment is authorized to operate. The permitted range of operating frequencies used by the EUT shall be declared by the manufacturer. The operating frequency range(s) will be tested considered under in clause 4.3.2 of EN 303 417

Results

Value	Notes
Operational Frequency band or bands	110-260KHz
Nominal Operating Frequency or Frequencies	175KHz
occupied bandwidth	20Hz
Note: Declared by the manufacturer	

ETSI EN 303 417 Subclasses 4.3.3 Operating frequency ranges

The operating frequency range for emissions shall be within one of the following limits: 19 - 21 kHz, 59 - 61 kHz, 79 - 90 kHz, 100 - 300 kHz, 6 765 - 6 795 kHz. The conformance test suite for operating frequency ranges shall be as defined in clause 6.2.1 . The manufacturer shall declare all necessary information (distance, orientation) which are necessary to set-up the different alignments as defined in clause 6.1.1 for each operational mode as defined in clause 4.2.3, Table 2. Conformance shall be established under test conditions to be declared by the manufacturer according to clause 4.1. The interpretation of the results for the measurements uncertainty shall be as given in clause 5.11.

Results

Worst test mode:mode 3

TEST CONDITION			**Lower Frequency Limit (100KHz)**	**Upper Frequency Limit (300KHz)**
			Frequency	
Temp.	**Voltage**		**Measured**	**Measured**
25 °C	**Vnor**	AC230v	175.22	175.48
-20 °C	**Vmin**	AC207v	175.19	175.49
	Vmax	AC253v	175.21	175.50
+55 °C	**Vmin**	AC207v	175.18	175.51
	Vmax	AC253v	175.20	175.52
Measurement uncertainty			$\pm 1*10^{-7}$	

ETSI EN 303 417 Subclasses 4.3.4 Limits for transmitters H-filed requirements

The H-field limits are provided in Table 3. They have been specified for control of any radiated emissions within the OFR originating from the WPT system (power transmission and accompanying data communication).

Measurement Equipment Used:

Item	Equipment	Manufacturer	Model No.	Serial No.	Characteristics	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	1166.5950.03	9KHz-3GHz	5/16/2018	1 Year
2.	Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	5/16/2018	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	000141	25MHz-2GHz	5/16/2018	1 Year
4.	Power Amplifier	CDS	RSU-M352	818	1MHz-1GHz	5/16/2018	1 Year
5.	Power Amplifier	HP	8447F	OPT H64	1GHz-26.5GHz	5/16/2018	1 Year
6.	Color Monitor	SUNSPO	SP-140A	N/A	--	5/16/2018	1 Year
7.	Single Line Filter	JIANLI	XL-3	N/A	--	5/16/2018	1 Year
8.	Single Phase Power Line Filter	JIANLI	DL-2X100B	N/A	--	5/16/2018	1 Year
9.	3 Phase Power Line Filter	JIANLI	DL-4X100B	N/A	--	5/16/2018	1 Year
10.	DC Power Filter	JIANLI	DL-2X50B	N/A	--	5/16/2018	1 Year
11.	Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	5/16/2018	1 Year
12.	Cable	Rosenberger	CIL02	A0783566	9KHz-3GHz	5/16/2018	1 Year
13.	Cable	Rosenberger	RG 233/U	525178	9KHz-3GHz	5/16/2018	1 Year
14.	Signal Analyzer	Rohde & Schwarz	FSV30	103040	9KHz-40GHz	5/16/2018	1 Year
15.	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1272	1GHz-18GHz	5/16/2018	1 Year
16.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	14GHz -26.5GHz	5/16/2018	1 Year
17.	Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	5/16/2018	1 Year
18.	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	5/16/2018	1 Year
19.	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	5/16/2018	1 Year
20.	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	5/16/2018	1 Year

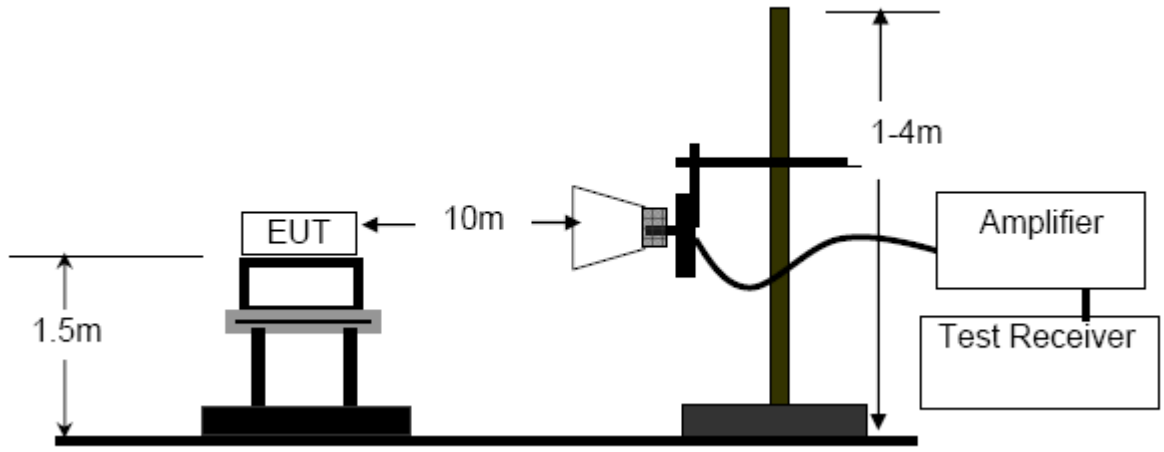
Limit at 10m

Table 3: H-field limits

Frequency range [MHz]	H-field strength limit [dBµA/m at 10 m]	Comments
0,019 ≤ f < 0,021	72	
0,059 ≤ f < 0,061	69,1 descending 10 dB/dec above 0,059 MHz	See note 1
0,079 ≤ f < 0,090	67,8 descending 10 dB/dec above 0,079 MHz	See note 2
0,100 ≤ f < 0,119	42	
0,119 ≤ f < 0,135	66 descending 10 dB/dec above 0,119 MHz	See note 1
0,135 ≤ f < 0,140	42	
0,140 ≤ f < 0,1485	37,7	
0,1485 ≤ f < 0,30	-5	
6,765 ≤ f < 6,795	42	

NOTE 1: Limit is 42 dBµA/m for the following spot frequencies: 60 kHz ± 250 Hz and 129,1 kHz ± 500 Hz.
NOTE 2: At the time of preparation of the present document the feasibility of increased limits for high power wireless power transmission systems to charge vehicles [i.4] was prepared. New specific requirements for such systems (e.g. higher H-field emission limits in the 79 - 90 kHz band) will be reflected within a future revision of the present document.

Test Set-Up



Test Procedure

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The bandwidth of the measuring receiver was set to 300Hz.
3. Measurement was made at a distance of 10m, Distance conversion factor was calculated according to Annex H(H.2) of ETSI EN300 330.
4. The measuring antenna was set to 1 meter away from the ground plain.
5. Maximization of the emissions was carried out by rotating the EUT, and adjusting the antenna azimuth.

Note: The receiving antenna found to be worse case at 90 degrees.

6. The test was done in both horizontal and vertical antenna polarizations.

Test Result

Worst test mode:mode 4

Frequency (KHz)	Antenna Polarization	Reading Level (dBμA/m) (10m)	Correct Factor(dB)	Corrected Amplitude(dBμA/m) (10m)	Limit (dBμA/m) (10m)	Over (dBμA/m)
175	90°	20.46	-31.12	-10.66	-5	-5.66
175	0°	19.97	-31.45	-11.48	-5	-6.48

ETSI EN 303 417 Subclasses 4.3.6 Transmitter out of band (OOB) emissions

The OOB limits are visualized in Figures 4 and 5; they are descending from the intentional limits from Table 3 at fH/fL with 10 dB/decade.The EUT is a single frequency WPT system.

Figures 4:

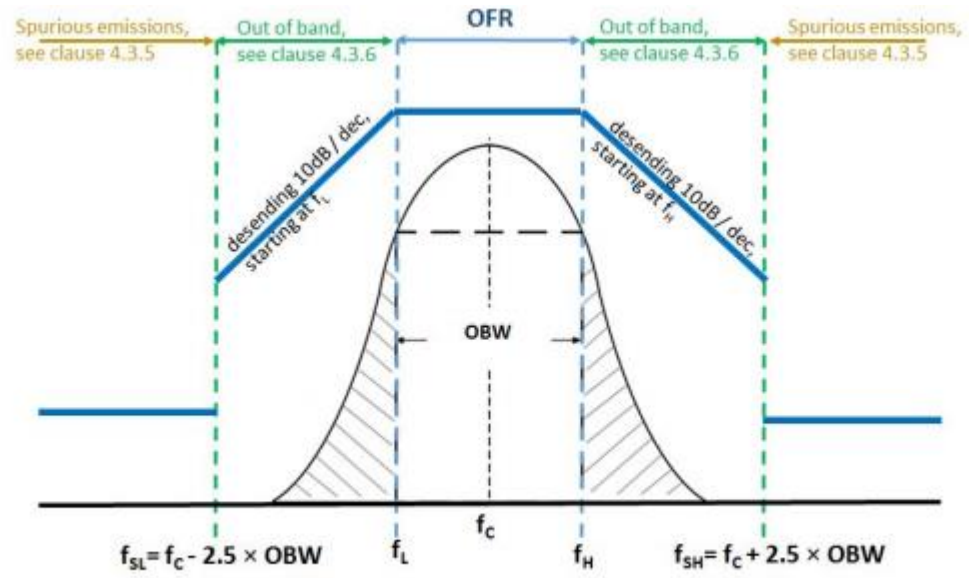


Figure 4: Out of band and spurious domain of a single frequency WPT system

Test Result

Worst test mode:mode 4

	Frequency (KHz)	Reading Level (dBμA/m) (10m)	Correct Factor(dB)	Corrected Amplitude(dBμA/m) (10m)	Limit (dBμA/m) (10m)	Over (dBμA/m)
OOB-L	174.05	10.92	-30.23	-19.31	-7.5	-11.81
OOB-L-H	175.50	11.38	-30.48	-19.10	-7.5	-11.60

ETSI EN 303 417 Subclasses 4.3.5 Transmitter radiated spurious domain emissions limits＜30MHz
ETSI EN 303 417 Subclasses 4.3.5 Transmitter radiated spurious domain emissions limits＞30MHz

The transmitter unwanted emissions, i.e. spurious and out-of-band emissions, shall not exceed the limits specified in clauses 4.3.5 of EN 300 3417

Below 30MHz

state	Frequency 9kHz≤f<10MHz	Frequency 10MHz≤f<30MHz
Operating	27dBuA/m at 9kHz descending 3dB/oct	-3.5dBuA/m
Standby	5.5dBuA/m at 9kHz descending 3dB/oct	-25dBuA/m

Above 30MHz

state	47MHz to 74MHz 87.5MHz to 118MHz 174MHz to 230MHz 470MHz to 862MHz	Other frequencies between 30MHz to 1000MHz
Operating	4nW (-54dBm)	250nW (-36dBm)
Standby	2nW (-57dBm)	2nW (-57dBm)

Test Procedure (below 30MHz)

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The bandwidth of the measuring receiver was set to 10KHz
3. Measurement was made at a distance of 10m, Distance conversion factor was calculated according to Annex H(H.2) of ETSI EN300 330.
4. The measuring antenna was set to 1 meter away from the ground plain.
5. Maximization of the emissions was carried out by rotating the EUT, and adjusting the antenna azimuth and height.
6. The test was done in both horizontal and vertical antenna polarizations.

Sample Calculation: Corrected Amplitude=Reading Level (dBμA/m)+Correct Factor (dB)

Test result

Below 30MHz

Test Mode: mode 4 **Tested by:** KYO
Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** May 18, 2018

Frequency (MHz)	Antenna Polarization	Corrected Amplitude (dBμA/m) (10m)	Limit (dBμA/m) (10m)	Over (dBμA/m)
0.0090	90°	-31.58	27.00	-58.58
0.0183	90°	-36.12	23.91	-60.03
0.0470	90°	-38.54	19.81	-58.35
0.0627	90°	-38.75	18.56	-57.31
0.0097	0°	-36.68	26.67	-63.35
0.0182	0°	-40.36	23.94	-64.30
0.0472	0°	-43.69	19.79	-63.48
0.0623	0°	-42.82	18.59	-58.58

Test Procedure (above 30MHz)

EUT was placed on a 1.5m outdoor wooden table. The search antenna is placed at 3m distances from the EUT and search antenna height is from 1-4m. With the transmitter operating at continuously mode, the turntable was slowly rotated to locate the direction of maximum emission. Once maximum direction is determined, the search antenna was raised and lowered in both vertical and horizontal polarizations.

The EUT was removed from the turntable and replaced with a linearly polarized antenna connected to a calibrated RF signal generator. The RF generator was set to a measured emission frequency and the search antenna was raised and lowered to produced a maximum received reading. The generator output was increased to match the radiated emission reading measured previously, and the result expressed in dB E.I.R.P. or ERP.

Test result

Above 30MHz

Test Mode: mode 4 **Tested by:** KYO

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** May 18, 2018

Frequency (MHz)	Antenna Polarization	Emission level (dBm)	Limit (dBm)	Margin (dB)	Detector
35.8200	Vertical	-69.16	-36.00	-33.16	QP
76.5600	Vertical	-75.35	-36.00	-39.35	QP
267.6500	Vertical	-58.52	-36.00	-22.52	QP
354.9500	Vertical	-66.24	-36.00	-30.24	QP
402.4800	Vertical	-59.75	-36.00	-23.75	QP
938.8900	Vertical	-61.82	-36.00	-25.82	QP
223.0300	Horizontal	-68.55	-54.00	-14.55	QP
267.6500	Horizontal	-51.64	-36.00	-15.64	QP
355.9200	Horizontal	-60.94	-36.00	-24.94	QP
402.4800	Horizontal	-54.36	-36.00	-18.36	QP
805.0300	Horizontal	-60.64	-54.00	-6.64	QP
938.8900	Horizontal	-57.85	-36.00	-21.85	QP

ETSI EN 303 417 Subclasses 4.4.2 Receiver blocking

The receiver blocking limits in Table 6 shall be fulfilled. The conformance test suite for performance criterion test shall be as defined in clause 6.3.2 and within the test-set-ups as defined in clause 6.1.

Table 6: Receiver blocking limits

	In-band signal	OOB signal	Remote-band signal
Frequency	Centre frequency (f_c) of the WPT system (see clause 4.3.3)	$f = f_c \pm F$ (see note)	$f = f_c \pm 10 \times F$ (see note)
Signal level field strength at the EUT	72 dBµA/m	72 dBµA/m	82 dBµA/m
NOTE: F = OFR see clause 4.3.3.			

The EUT shall achieve the wanted performance criterion, see clause 4.2.2, in the presence of the blocking signal.

Test result

Worst test mode:mode 3

	In-band signal	OOB signal		Remote-band signal	
Frequency	175KHz	174.05KHz	175.05Khz	174.5KHz	175.5KHz
Signal level field strength at the EUT	72 dBµA/m	72 dBµA/m		82 dBµA/m	
Performance	Normal Function	Normal Function		Normal Function	
Result	Pass	Pass		Pass	

ETSI EN 303 417 Subclasses 5.11: Measurement uncertainty

The conditions for the measurement uncertainty shall be as given in ETSI EN 300 330 [1], clause 5.13. All the measurement equipments and accessories have been carefully selected to meet the maximum measurement uncertainty specified below:

Radiated Emissions of Receivers	**± 6dB**
RF frequency	**±1 x 10-7**
RF power, conducted	**±1 dB**
Temperature	**±1 °C**
Humidity	**±5 %**

For the test methods, according to the present document the uncertainty figures shall be calculated according to the methods described in the ETSI TR 100 028 [i.14] and shall correspond to an expansion factor (coverage factor) k = 1,96 or k = 2 (which provide confidence levels of respectively 95 % and 95,45 % in case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).